

Whitman (Royal)

THE ELEMENTS  
OF THE  
DIFFERENTIAL DIAGNOSIS

—OF—  
Pott's Disease in Childhood.

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BY

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## *THE ELEMENTS OF THE DIFFERENTIAL DIAGNOSIS OF POTT'S DISEASE IN CHILDHOOD.*

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Differential diagnosis, in other words the early recognition of a group of symptoms peculiar to a certain disease, implies knowledge of the normal functions of the organ or part affected by disease, and knowledge of the character of the disease and of its variations and modifications, under different circumstances.

The elements of the differential diagnosis of Pott's disease, should include I apprehend, a description of the normal functions of the spine; the character of the disease, and the symptoms of the disease, and of its complications which more often cause errors in diagnosis; explaining in logical sequence if may be, their causes and significance.

The spine serves not only as the elastic support of the body, but it encloses the spinal cord, from which branch the nerves of motion and sensation. Although as a whole, it is constantly changing its shape, with every change in attitude, yet under the influence of the force of gravity and the action of the muscles in the preservation of the erect posture, a certain fixed contour is attained known as normal—forward in the upper, back-



ward in the middle and forward again in the lower region of the spine.

Each of these regions has certain movements and functions peculiar to itself; the function of the cervical spine is to support the head, and allow free motion; the middle portion is made rigid in the formation of the thoracic cavity, the lower region is again free and movable.

Pott's disease is a chronic, tuberculous destructive disease of the spongy substance of the bodies of the vertebrae; the partially destroyed bodies collapse, and the unaffected portion of the spine bends to accommodate itself to the irregularity; thus the angular posterior projection characteristic of Pott's disease is formed.

Pott's disease may also be classed as a constitutional disease, in the sense that tubercle in bone implies other and older deposits elsewhere, and because the local affection is directly influenced by the condition of the patient, as the general condition is at once improved by the relief of local irritation or pain.

The symptoms of Pott's disease may be divided into three classes:

1st. Those dependant on the disease as it affects the function of the spine as an elastic support.

These are pain, weakness, muscular rigidity or distortion, and deformity of bone.

2nd. Symptoms dependant on the implication of the contained spinal cord and its nerves.

These are reflected pain, motor spasm, local or general paralysis.

3rd. Symptoms dependant on the effect of inflammation, or abcess on parts adjoining or attached to the spine, as seen in obstruction to breathing or swallowing in the upper, or muscular contraction in the lower region of the body.

4th. General constitutional symptoms, as anaemia, loss of strength and appetite, or fever the effect of local irritation or suppuration.

The first group of symptoms is primary, such as one may expect if the disease is seen in the early stage. These early symptoms may be entirely overlooked however, and sudden weakness or paralysis, the obstruction to breathing by a retropharyngeal abcess, the limp caused by psoas contraction, may be the prominent symptom for which the patient is brought for treatment; such are secondary or complicating symptoms.

The field for differential diagnosis may thus include diseases which may cause weakness, deformity, abcess, neuralgic pain, motor disturbances and paralysis. It is always well, however, to keep this distinction of symptoms clearly in mind; that secondary symptoms are not necessary to the diagnosis of Pott's disease, while the primary symptoms, which are always present, are necessary to establish the diagnosis, and to explain the complicating symptoms.

The most significant of the early symptoms is muscular spasm; the normal range of motion is no longer possible in the diseased spine, it

causes pain and is restrained by involuntary muscular rigidity. This rigidity of the upper spine interferes with the motion of the head; in the lower region with stooping and bending, while it may cause no marked symptoms in the middle region where motion is normally so slight. With muscular spasm are combined the other symptoms of bone disease, pain, weakness, and later, deformity.

As the contour of the spine is the effect of gravity, any deviation in one direction must be compensated for by a corresponding change in the opposite direction, elsewhere. Again as the normal flexible spine is constantly changing its shape with every change in attitude, or muscular movement, it is evident that pain or weakness or muscular rigidity or deformity of bone must cause a change in attitude, which must be an early and significant symptom of the disease. It may be merely an attitude of restraint, as contrasted with that of freedom and health. It may be characteristic of the disease and of the portion of the spine affected.

Familiarity with the attitudes of the healthy child, enables one to detect slight changes from the normal standard, and thus to suspect Pott's disease in the early stage.

Knowledge of the normal contour of the spine, the motions, functions and anatomical relations of its different parts enables one to diagnose Pott's disease, and to locate it with certainty.

The angular deformity is usually considered

the one diagnostic sign of Pott's disease, and until that sign is prominent and aggressive, cases are not often referred for special treatment.

Perhaps the most effective work for early diagnosis is done by the relatives of patients, who see the disease in its different stages at clinics. They are ever ready to recount the early symptoms, the progress of the disease, and the sufferings of their child, nor do they ever forget to condemn the ignorance of the doctor who failed to recognize the affection. Thus early cases are sometimes brought by anxious mothers, because "something is wrong," which perhaps best expresses the change from the normal standard of disposition, health and activity. The child may be fretful, easily fatigued; likes to lie on the floor, refuses to walk, or cries when lifted suddenly, or complains of pain in the abdomen. It may be slow or awkward in its movements, or a distortion of the head or body, or limp may be the prominent symptom in the history according to the situation of the disease, or the watchfulness of the relatives. In the better class any symptom may be considered important, in others, pain is almost the only symptom that attracts attention.

Although histories, as obtained from relatives are often inaccurate and misleading, one may usually ascertain when the child was last perfectly well, if the onset of symptoms was sudden or gradual, preceded or not by contagious disease or injury; injury being of significance only when the symptoms followed

immediately upon it and have since continued. The child is then to be stripped naked and its general appearance, attitude and facial expression, its movements in walking, rising and bending, carefully noted. Attention is thus called to the suspicious region; that region is then to be examined by itself, for change in shape, restriction of motion or deformity.

Failure to make an early diagnosis of Pott's disease, is more often the result of carelessness or ignorance on the part of the examiner, than of obscurity of symptoms. When symptoms are obscure a second examination, with an interval for rest of the patient and reflection for the examiner, will usually clear up the doubtful points. The essential principles of early diagnosis having been indicated, their application may be illustrated in the different regions of the spine.

Although muscular spasm and distortion are early symptoms of disease of any portion of the cervical region, yet the upper extremity of the spine composed of the condyles of the occiput, the atlas and axis, differs so materially in function and often in the character of symptoms, as to form a region by itself. The tissue of the bones is compact, and there is no intervening disc of cartilage to connect the vertebrae with one another, the synovial membrane is extensive; the motion of the region is true joint motion, with limits defined by special ligaments and muscles. As a consequence diseases is here more often limited in extent, or may be a primary affection of the synovial

membrane and thus more acute and rapid in its progress. Pain often confined to one side, is reflected upwards instead of downwards, abscess more frequent and from the position of the larynx immediately below, may cause early symptoms of obstruction.

In a well marked case, when the special movements of nodding and rotation are cut off by disease of the joints, in which these movements are alone possible, the evident stiffness of attitude or distortion of the head, the instinctive seeking of support, the look of apprehension, the scream of pain and voluntary resistance whenever an attempt is made to raise the chin or rotate the head, the change in contour of the neck, the thickening about the seat of disease are symptoms only simulated by severe traumatism; the history would then make the diagnosis clear, and in any event the question could be only of prognosis, not of treatment. In less well marked cases, or when the disease is at a lower level the principal symptom may be a distortion of the head by muscular contraction; the question then arises whether the contraction is symptomatic of bone disease, or of a primary affection of muscle, or irritation of nerves secondary to inflammation, not connected with the spine.

The various forms of congenital, or acquired wry neck when seen in a later stage, show simply contraction without pain, the shortened tissues stand out as cords on the neck when tension is made upon them, and diagnosis is simple. The acute rheumatic wry neck is

distinguished by its acute onset, the local pain and tenderness and the insignificance of general symptoms. Sprains or other injuries are to be distinguished by the history of distortion and pain, following immediately on the injury, because the pain is usually local, combined with local tenderness. The greatest difficulty is experienced in the forms of inflammatory wry neck often following contagious diseases, combined with indurated or suppurating glands, in which the contraction is partly due to irritation of nerves, and partly to direct inflammation of muscles. The distinction is made on the following points:

The rigidity and distortion of Pott's disease is a rigidity to restrict painful motion, not in one, but in all directions; the contraction usually disappears when the muscles are relieved from this duty—for example, if the child is placed on its back, the head supported by the hands of the examiner, the contraction, distortion and pain will often entirely disappear under gentle traction.

The contraction of inflammatory wry neck persists, tension causes pain and is resisted by the patient. Motion is limited particularly in one direction, that opposed to the contraction, and there is an absence of the peculiar constant apprehensive spasm of bone disease. Pain is more often local, combined with local tenderness and infiltration; that of Pott's disease reflected away from the seat of contraction.

In wry neck, the sterno mastoid is more often

the prominent and contracted muscle, in Pott's disease the shorter and deeper lateral and posterior muscles are more often affected.

In rare cases of cervical disease, and sometimes as low as the middle dorsal region, the head may be drawn backwards, and this attitude or cervical opisthotnos may be simulated by basilar meningitis or marasmus, or it is a temporary symptom in infants without explained cause, or may be congenital. The history and the appearance of the infant, the fact that the head may be replaced in proper position without pain, makes diagnosis clear. Localized diphteritic paresis of the muscles of the neck, affecting more particularly the trapezius, may allow the head to fall forward. In addition there may be contraction of one sterno-mastoid combined with local tenderness. Such appearances are confusing until a history has been obtained, when corresponding paralysis of parts supplied by the spinal accessory, the paralysis of the fauces or accomodation of the eyes, clear up the doubtful points. Several cases have been seen, in which diagnosis of Pott's disease had been previously made.

Abcess appearing as a tumor in the pharynx, interfering with breathing and swallowing, may be a relatively early symptom, mistaken for croup, adenoid vegetation or enlarged tonsils. Palpation and inspection will show the cause of the symptoms—the symptoms of Pott's disease, the source of the pus.

In general then, the distinguishing features between the distortions of Pott's disease and

those due to local irritation, inflammation or injury, are these:

Such distortion is but one of the symptoms of a serious, protracted and constitutional affection—when the contraction is overcome, treatment is but begun.—In the other forms of contraction with which it is likely to be confused, the cure of the local distortion is a cure of the disease.

Disease of the middle or thoracic region, where motion is so limited, is not often seen in the earliest stage, and I am inclined to think that early symptoms are not as significant here as elsewhere.

In young children the most characteristic attitude is one of weakness, a forward stoop of the body, while the head hangs backward or on one shoulder. This attitude combined with the grunting respiration or expiratory sigh caused by the effort to restrain the motion of the ribs on the weakened spine, are often early and constant symptoms.

In disease of a lower point, as the lumbar region is approached, the attitude may change to one of erectness and rigidity, there is an elevation of the shoulders, and a balancing attitude of the arms. It is in disease of this region that the sudden cry of pain is noticed when the child is lifted, that it instinctively seeks support by clinging to the mother's dress or other objects, or sits supporting the body with the hands on the seat of the chair. In older and more robust children, the symptoms of weakness and pain may be much less

marked, and the slowly increasing deformity is thought to be round shoulders, or a lateral deviation thought to be simple rotary lateral curvature. The most characteristic of all the rational symptoms of Pott's disease, is pain reflected along the intercostal nerves to the sides and front of the body; it may be an occasional complaint, it may be almost constant, emphasized by the so called night cry. In the upper dorsal region the pain is referred to the chest, and is often accompanied by an irritating cough, or by irregularity in the rythm of respiration. At a lower region the pain is referred to the abdomen.

Thus patients may be treated for asthma, bronchitis or bowel disturbances long after the deformity of the spine is apparent. As such mistakes imply a neglect of proper examination, they need only be mentioned.

Marked weakness, and the so called loss of walk are symptoms which cannot be overlooked, and seem to be considered as especially significant of Pott's disease: Thus children who remain weak after contagious or other exhausting disease, or as the effect of marasmus or rachitis or cerebral deficiency, are brought for braces on the supposition that they are suffering from spinal disease. It is only necessary to mention the fact, that simple weakness may cause a general postural curve of the spine, which is more or less rigid according to the time it has persisted. The absence of pain, the appearance of the patient, the history of the case, will readily exclude all these affections except rachitis, in

which pain may be a prominent symptom combined with a rigid curvature. The examination, however, will show the existence of general disease, in the enlarged epiphyses, and beaded ribs. The curvature is seen to be postural by observing the child as it sits in its habitual attitude, or as it is held on the mother's arm. The curvature is rounded, and if the child is placed on its face the legs raised and gentle massage applied to the projection, it may be partially or entirely effaced; such would not be the case in a corresponding deformity the result of Pott's disease.

It is in disease of the upper dorsal region that one of the complications of Pott's disease more often occurs, paralysis—from implication of the spinal cord. This may be a relatively early symptom; it may precede deformity, but is always accompanied by pain and local rigidity. The character of the paralysis is spastic paraplegia, that is, increased reflexes or stiffness of the limbs—it could not therefore be confounded with the other form of paralysis, most often seen in children, resulting from anterior-polio-myelitis, which is sudden in onset often confined to one limb—a flaccid paralysis with loss of reflexes and not accompanied by the symptoms of Pott's disease: The spastic paraplegia of cerebral origin, although similar in character, as a rule implies semi-idiocy, and need only be mentioned to exclude it.

There then remains only the deformity, which in very mild cases, may be mistaken for round shoulders, but in Pott's disease in addition, there is always more rigidity, more pain

and more weakness.

The same distinction applies to the differentiation from rotary lateral curvature. A slight deviation of the spine may be an early symptom of Pott's disease of the middle region, but it is a deformity always accompanied and overshadowed by the symptoms of pain and rigidity. The simple postural rotation is not accompanied by such symptoms; it is for the relief of deformity that patients are brought, not for the relief of pain and weakness.

As a patient suffering from acute empyema, was recently referred for treatment on the supposition that the pain and deformity were the result of Pott's disease, it may be mentioned that acute or chronic affections of the thoracic viscera, may distort the spine.

Disease of the lower dorsal and lumbar region is early shown in the peculiar attitude of over erectness or exaggerated lordosis. As this attitude is only simulated by such rare affections as congenital dislocation of the hips, pseudo hypertrophic muscular paralysis or by paralysis of the spinal or abdominal muscles diagnosis sometimes can be made at a glance. As this region is the elastic portion of the spine, constantly changing its shape in bending, walking, or in the sitting posture, the other symptoms of Pott's disease are very evident in the rigidity, the awkwardness and peculiar waddling gait. The patient is stiff and slow in changing a position once assumed, and may be even unable to turn in bed without assistance. Examination of the part shows the rigidity, the limitation of special motion by muscular spasm, the inability to stoop, and the evident weakness.

The secondary symptoms, or complications, are those which cause the difficulty in diagnosis—of these, the most important is abscess, which involving the psoas and iliacus muscles, flexes the thigh making extension painful—; this complication immediately causes a change in attitude, there is a forward stoop and well marked limp. This is so frequent as to be one of the characteristic attitudes of disease in this region. In this stage cases are almost always referred for hip disease.

Differential diagnosis may be perhaps best illustrated, by certain typical cases of disease in this region. In order of frequency they are:

1st. The uncomplicated cases—characterised by the diagnostic attitude, of over-erectness, the rigidity, the inability to bend or the evident weakness in attempting to rise again—the pain referred to the inguinal region or buttocks.

2nd. The cases mistaken for hip-disease because of the limp—ordinarily the diagnosis is simple. The limp of hip-disease is a limp caused by pain, weakness or contraction of muscles; movements of the hip are limited in all directions, and when the limit is passed, pain and muscular spasm are evident. The limp of psoas contraction is a limp caused by shortening, the leg is drawn towards the body, and the body towards the leg, an attitude not usually seen in hip-disease. Motion is limited only in one direction, that opposed by the contracted muscles. The rigidity of the spine, or deformity at the seat of disease, and a tumor in the pelvic fossa, will usually make the cause of the symptoms clear.

3rd. A type seen in young infants—who cry when lifted, or when the diapers are changed, who scream when undressed, and contract every muscle of the body when manipulated. The symptoms usually may be localized in the lower region of the body, but it is sometimes

impossible at the first examination to decide whether the lumbar spasm is due to hip-disease, or the contraction of the thigh to spinal disease. In such cases the application of a plaster spica bandage, to rest both hip and spine, may make the diagnosis clear at the next examination.

4th. Patients, often accompanied by ignorant relatives bent over, supporting the body with the hands on the knees, or unable to stand showing evidence of pain and exhaustion, who resist examination, who scream when the leg is moved, or the abdomen palpated. When a history is obtained, it will be usually found that the onset of the affection was sudden, accompanied by pain and fever and that the attitude was assumed from the beginning. Such symptoms are usually those of acute intra-abdominal inflammation, such as perityphlitis or perinephritis. The latter affection is sometimes much less acute in its onset, and psoas contraction and rigidity of the back are the prominent symptoms. The psoas contraction of Pott's disease is, however, always preceded by certain symptoms, peculiar to the disease, while the distortion of the spine from these other causes, is sudden in its onset, and accompanied by the symptoms more or less characteristic of the special organ involved.

5th. Cases of disease of the lowest region of the spine, accompanied by symptoms pointing to the hip, pain reflected to the thigh: The child limps, or refuses to support the weight on the leg, or contracts the muscles when the limb is moved. If, however, the pelvis is steadied the hip may be moved without pain. There is often the peculiar lordosis, and a lateral deviation of the spine, but rigidity is much less marked, and the patients may be able to bend without appreciable difficulty.

In such cases the pain reflected down the

leg is mistaken for sciatica, but pain is usually in both legs, and is relieved often completely by rest on the back, thus differing from sciatica.

Again, sciatica is very rare in children, as is the chronic lumbago, the strains of the lumbar region or rheumatic deformity of the spine. Nor is it necessary to consider displacements of the uterus, or inflammation of its appendages, which in the adult, may cause symptoms simulating somewhat those of Pott's disease.

As a sequel of infectious diseases, the joints of the spine are sometimes affected, the symptoms being explained by the preceding history.

The so called neurotic spine, rarely an affection of childhood, is characterised by the exaggeration of the symptoms of local tenderness, and the irregularity and want of correspondence of groups of symptoms, which characterise local Pott's disease.

It only remains to call your attention to the fact, that Pott's disease, does not confer an immunity from other affections, and that the plaster jacket, or brace, may cover a variety of diseases, which are sometimes overlooked and untreated, or thought to be complications of a disease, of which they are independent.

I cannot hope to have done more than to indicate some of the affections, for which Pott's disease may be mistaken, but I hope that attention has been called to the principle of diagnosis by exclusion, resting on careful history, grouping of symptoms, general observation of the attitude and appearance of the patient; finally on the examination of the special region to which these symptoms point. In other words, on the logical explanation of the symptom complex of Pott's disease, which varies with the character and duration of the disease, with the function and anatomical relations of the part involved, and with the age, inheritance, and surroundings of the patient.



